

method for fabricating a semiconductor package of the invention; and

FIG. 8 is a sectional view of a fine pitch BGA semiconductor package in use of a method for fabricating a semiconductor package of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A semiconductor package and a method for fabricating a semiconductor package proposed in the present invention are fully described in the following embodiments with reference to FIGs. 3-7, wherein the method is applicable for fabricating all types of BGA (ball grid array) semiconductor packages, and a FCBGA (flip chip ball grid array) semiconductor package is exemplified herein, in an effort to depict a molded underfilling technology in detail.

FIGs. 3A and 3B illustrate a top view and a sectional view of a BGA semiconductor package 2 of the invention, respectively. As shown in the drawings, the BGA semiconductor package 2 comprises a substrate 20; a semiconductor chip 22 reflowed on the substrate 20 by a plurality of solder bumps 21; a plurality of solder balls 23 implanted on a back surface 201 of the substrate 20 for electrically connecting the semiconductor chip 22 to external devices; and an encapsulant 29 for encapsulating the semiconductor chip 22, and formed with a plurality of outwardly-extending portions 28, which are relative smaller in thickness and located corresponding to corner positions 253 of a molding cavity (not shown).

As shown in FIG. 4, a substrate 20 having a front surface 200 and a back surface 201 is prepared, wherein a chip bonding area 202 is predefined on the front surface 200 of the substrate 20; a semiconductor chip 22 is bonded onto the chip bonding area 202 of the substrate 20 in a flip-chip manner via a plurality of solder bumps 21; and a plurality of ball pads (not shown) disposed on the back surface 201 of the substrate 20 are used to implant a plurality of solder balls (not shown) thereon in a subsequent process. Then, after the semiconductor chip 22 is bonded in position, a cavity 24 is

formed between the semiconductor chip 22 and the substrate 20 at intervals between the adjacent solder bumps 21. In order to reinforce joint strength between the solder bumps 21 and the substrate 20, a flip chip underfilling process is necessarily performed.

In the invention, a molded underfilling technique is employed, i.e. molding and flip chip underfilling processes are accomplished simultaneously. As shown in FIGs. 5 and 6 (a bottom view of an upper mold), a substrate 20 having a semiconductor chip 22 mounted thereon is placed into a mold 25, which consists of an upper mold 250 having a molding cavity 252 for accommodating the chip 22, and a lower mold 251 to be engaged with the upper mold 250. At corner positions 253 of the molding cavity 252 of the upper mold 250, besides one formed with a runner 26, the others are provided with a plurality of air vents 27 connected to outside, so as to ventilate air in the molding cavity 252 and eliminate void formation during injecting a molding compound used in the molding process. Since the foregoing description is accomplished by using conventional techniques, it is not further detailed herein. It is to be noted that the invention is characterized in forming a plurality of recess portions 28 connected to the air vents 27 in proximity to the corner positions 253 of the molding cavity 252. As such, the recess portions 28 has a height h much smaller than a height H of the molding cavity 252, thereby making an encapsulant 29 formed at the recess portions 28 into protruding portions (designated by the same reference numeral 28 as the recess portions) of only 0.3-1.0mm in thickness, as shown in FIG. 7.

In order to shorten the filling and curing time in the flip chip underfilling process, the encapsulant 29 of the BGA semiconductor package 2 is made of a molding resin such as epoxy resin (designated by the same numeral 29 as the encapsulant) having low viscosity, high fluidity and small fine filler size. After the molding resin 29 flows into the recess portions 28 at the corner positions 253 in the molding cavity 252, due

to the relative smaller height h of the recess portions 28, the molding resin 29 more rapidly absorbs heat transmitted from the mold 25, resulting in increase in the viscosity and decrease in the flow rate of the molding resin 29. The slowed down molding resin 29 can therefore be prevented from flashing out of the air vents 27. Such a flash preventing method is also applicable to a molding process for encapsulating a fine pitch chip 32. As shown in FIG. 8, in the provision of recess portions 38 for preventing resin flash from occurrence, a molding resin 39 with even smaller fine filler size and higher fluidity can be used during molding. This not only reduces resin filling impact and wire sweep, but also increases the variety of materials applicable for making an encapsulant 39.

The invention has been described using exemplary preferred embodiments. However, it is to be understood that the scope of the invention is not limited to the disclosed embodiments. On the contrary, it is intended to cover various modifications and similar arrangements. The scope of the claims, therefore, should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements.